

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Inventor:	Alexander Golitschek Edler Von Elbwart, et al.	Art Unit: 2617
Appln. No.:	10/594,556	Exr. S. D'Agosta
Filed:	September 24, 2007	Conf. No. 5571
For:	METHOD FOR PERFORMING A SCHEDULING ALGORITHM WITH A MINIMUM RESOURCE PARAMETER AND METHOD OF CALCULATING SAME	

AMENDMENT UNDER 37 C.F.R. § 1.116

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the final rejection mailed August 3, 2010, the following amendments and remarks are respectfully submitted:

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## IN THE CLAIMS

Please amend the claims to read as follows:

### Listing of Claims

1-17. (Cancelled)

18. (Currently Amended)      A method for performing a scheduling algorithm in a scheduler of a wireless communication system, comprising:

obtaining from a communication unit a minimum resource parameter that indicates a minimum number of allocation units to be scheduled for a user or service in a scheduling frame in order to meet a resource constraint of the communication unit, and

scheduling, in the scheduling frame, resources for radio access to the communication unit wherein the resources are scheduled in the allocation units and in accordance with the minimum resource parameter,

wherein the allocation units are scheduled to the communication unit terminal only if the minimum number of allocation units indicated by the minimum resource parameter can be scheduled for the service or user within the scheduling frame.

19-20. (Cancelled)

21. (Previously Presented)      The method according to claim 18, wherein the minimum resource parameter represents a minimum number of information bits per scheduling frame for the user or the service.

22. (Currently Amended) The method according to claim 18, wherein the minimum resource parameter represents a minimum ratio of a number of processed information bits processed by the communication unit in a scheduling frame to an expended processing and operating power spent during the radio access by in the communication unit in said scheduling frame.

23. (Previously Presented) The method according to claim 18, wherein the minimum resource parameter represents a sufficient quantity to exceed a power efficiency threshold in the scheduling frame.

24. (Previously Presented) The method according to claim 18, wherein the minimum resource parameter is signaled periodically from the communication unit to the scheduler.

25. (Previously Presented) The method according to claim 18, wherein the minimum resource parameter is signaled from the communication unit to the scheduler upon request by the scheduler.

26. (Previously Presented) The method according to claim 18, wherein the obtaining of the minimum resource parameter is initiated by the communication unit upon fulfillment of power management conditions.

27. (Previously Presented) The method according to claim 18, wherein the scheduling includes considering in addition at least one of the scheduling parameters of channel condition,

amount of data available for transmission, Quality of Service (QoS), delay, data rate and carrier to interference ratio.

28. (Previously Presented) The method according to claim 18, wherein the scheduling frame has at least one of a time division, frequency division or code division frame structure.

29. (Previously Presented) The method according to claim 18, wherein the allocation units have a quantity of either one of transmittable information bits, Internet Protocol (IP) packets, code blocks or modulation symbols.

30. (Previously Presented) The method according to claim 18, wherein the minimum resource parameter is signaled by the communication unit on a separate control channel associated to a data channel over which the allocation units are transmitted.

31-33. (Cancelled)

34. (Currently Amended) A base station for use in a wireless communication network, comprising:

a processing section configured to obtain, from a mobile terminal, a minimum resource parameter that indicates a minimum number of allocation units to be scheduled for a service or user in a scheduling frame in order to meet a resource constraint of the mobile terminal, and

a scheduler configured to schedule, in the scheduling frame, resources to the mobile terminal in a form of allocation units and in accordance with the minimum resource parameter,

wherein the scheduler schedules the allocation units to the mobile terminal only if the minimum number of allocation units indicated by the minimum resource parameter can be scheduled for the service or user of the mobile terminal within the scheduling frame.

35-46. (Cancelled)

## REMARKS

Reconsideration and allowance of the application are respectfully requested in light of the above amendments and the following remarks.

Claims 18, 22 and 34 have been amended to make minor grammatical changes and to further clarify aspects of the “minimum resource parameter” feature recited by claim 22. Support for the amendments can be found, for example, at paragraphs [0053]-[0055] of the published U.S. application. (It should be noted that references to the specification and drawings throughout this amendment are for illustrative purposes only and are not intended to limit the scope of the invention to the referenced embodiments). No new matter is entered.

The Office Action maintains the rejection of claims 18-46 under 35 U.S.C. § 103(a) as being unpatentable over US 6,745,044 to Holtzman (hereinafter, “Holtzman”) and further in view of Havinga, “Energy-efficient TDMA Medium Access Control protocol scheduling” (hereinafter, “Havinga”), and further in view of either Klein (US Printed Pub. 2004/0053574) (hereinafter, “Klein”) or Hoagland (US 6,731,947) (hereinafter, “Hoagland”). The Office Action acknowledges that the Applicants’ arguments filed on July 22, 2010 have been fully considered but indicates that the Applicants’ arguments are not persuasive and provides an explanation as to why the Applicants’ arguments are not persuasive.

Upon reviewing the Office Action’s most recent explanation supporting the rejections, the Applicants respectfully traverse based on the points set forth below.

Claim 18 is directed towards a method for performing a scheduling algorithm in a scheduler of a wireless communication system and recites the features of:

“...obtaining from a communication unit a minimum resource parameter that indicates a minimum number of allocation units to be scheduled for a user or

service in a scheduling frame in order to meet a resource constraint of the communication unit, and

scheduling, in the scheduling frame, resources for radio access to the communication unit wherein the resources are scheduled in the allocation units and in accordance with the minimum resource parameter,

wherein the allocation units are scheduled to the communication unit only if the minimum number of allocation units indicated by the minimum resource parameter can be scheduled for the service or user within the scheduling frame (emphasis added).”

As indicated above, the method recited by claim 18 recites that the minimum resource parameter that indicates a minimum number of allocation units is obtained from a communication unit, and that the allocation units are scheduled to the communication unit.

With respect to the feature of “a minimum resource parameter that indicates a minimum number of allocation units,” the Office Action (pg. 2) states:

“[t]he examiner must give each claims its most broadest, reasonable interpretation and notes that the claim is interpreted as having a schedule function to support multiple mobile unit data rate needs/request whereby a resource need can be a data rate, type of service, etc. Hence the prior art clearly teach scheduling of data rates for multiple mobile users. Note that the “only assigning if the minimum resource allocation can be assigned” reads on an initial data rate that can be modified which is taught by the prior art (e.g. at least a minimum is assigned which can be equal-or-more than the minimum requested)”

Then, the Office Action (pg. 4) alleges that “Holtzman figure 5, #514, #522, #532, #544” discloses the feature of “...obtaining from a communication unit a minimum resource parameter that indicates a minimum number of allocation units to be scheduled for a user or service,” as recited by the Applicants’ claim 18. Further, with respect to the feature of “wherein the allocation units are scheduled to the communication unit only if the minimum number of allocation units indicated by the minimum resource parameter can be scheduled for the service or user within the scheduling frame,” as recited by the Applicants’ claim 18, the Office Action (pg.

3) alleges “his prior art teaches (at least) determining a data rate that can be used to support a user/service and assigning that rate/channel.”

Though the Office Action correctly states that, as a matter of law, pending claims must be “given their broadest reasonable interpretation consistent with the specification (emphasis added),” *see Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005), in this case, the Office Action’s generalizations about the recited features of claim 18 are unreasonable and clearly go beyond what is recited by claim 18. As a result, the Office Action’s interpretation neglects certain features recited by claim 18, which, as a matter of law, is not an appropriate method to examine claims (*see, e.g., In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970)(holding “All words in a claim must be considered in judging the patentability of that claim against the prior art (emphasis added)”).

Here, it is immediately apparent that the steps of FIG. 5 shown in Holtzman referred to by the Office Action do not teach or suggest the feature of “...obtaining from a communication unit a minimum resource parameter that indicates a minimum number of allocation units to be scheduled for a user or service,” as recited by the Applicants’ claim 18. Even the text passages related to these methods steps do not provide any teaching or suggestion that seems relevant to the above-noted feature.

In the description of step #512 in FIG. 5, Holtzman (col. 12, lines 32-34) discloses that:

“Prior to scheduling transmission to a new data user, the throughput  $T_i(0)$  of the data user is initialized to a particular data rate (e.g.,  $T_i(0) = 9.6$  Kbps), at step 512.”

However, Holtzman does not teach or suggest that this initialization comprises obtaining the minimum resource parameter by the scheduler “from a communication unit,” as recited by the Applicants’ claim 18. Further, Holzmann also fails to teach or suggest that this initial data



rate is somehow related to a “resource constraint of the communication unit” (given by the communication unit) as recited by the Applicants’ claim 18.

On the contrary, Holtzman teaches that the initial data rate is a system-inherent parameter, not a communication specific parameter. Specifically, in the description of step #524, Holtzman (col. 13, lines 5-12) discloses:

“The previously determined possible data rate  $R_j(k+1)$  for the selected data user is then quantized to one of the supported data rates  $\{0, R_{min}, \dots, R_i, R_{i+1}, \dots, R_{max}\}$ , at step 524. The quantized rate  $R_j(k+1)$  for the selected data user can be determined as:

$$R_j^*(k+1) = \begin{cases} 0 & R_j(k+1) < R_{min} \\ R_{max} & R_j(k+1) \geq R_{max} \\ R_i & R_i \leq R_j(k+1) < R_{i+1} \end{cases} \quad \text{Eq (24)}$$

In equation (24), the data rate for the selected data user is set (1) to zero if the possible data rate  $R_j(k+1)$  is less than the lowest supported data rate  $R_{min}$ , (2) to  $R_{max}$  if the possible data rate  $R_j(k+1)$  is greater than or equal to the highest supported data rate  $R_{max}$ , or (3) to the next lower quantized data rate  $R_i$  otherwise, where  $R_i \leq R_j(k+1) < R_{i+1}$ .”

This passage discloses that the specific data user is only assigned a transmit power for transmission (corresponding to a non-zero data rate), if the quantized data rate exceeding  $R_{min}$  of Eq. 24 is exceeded.

However, there is absolutely no teaching or suggestion anywhere in Holtzman that the  $R_{min}$  is defined by the communication unit, i.e., is a minimum resource parameter of the communication unit that ensures that the resource constraint of the communication unit is met. In other words, the value  $R_{min}$  as disclosed by Holtzman does not read on the recited feature of: “a minimum resource parameter that indicates a minimum number of allocation units to be

scheduled for a user or service in a scheduling frame in order to meet a resource constraint of the communication unit,” as recited by the Applicants’ claim 18. Instead, Holtzman discloses that  $R_{min}$  is the “lowest supported data rate,” i.e., the lowest data rate supported by the communication system that can be selected by the scheduling function in the communication system. As such, the value  $R_{min}$  is a system-inherent parameter, not a communication specific parameter. Thus, to the extent that Holtzman teaches or suggests anything related to the feature of “a minimum resource parameter,” Holtzman fails to teach or suggest “a minimum resource parameter that indicates a minimum number of allocation units to be scheduled for a user or service in a scheduling frame in order to meet a resource constraint of the communication unit,” as recited by the Applicants’ claim 18.

In fact, not a single passage in Holtzman discloses (or is even related to) the consideration of a specific resource constraint obtained by the scheduler from the communication unit (see Holtzman, col. 4, lines 54-67; col. 5, lines 35-41, col. 5, line 49 to col. 6, line 7; col. 6, lines 20-39; col. 7, lines 32-36; col. 7, line 66 to col. 8, line 7). These cited passages each support that Holtzman’s invention is related to an accurate estimation of the available transmit power for power control, rather than the consideration of a communication-unit specific resource constraint in scheduling transmission.

Accordingly, the Applicants submit that the teachings of Holtzman, Havinga, Klein and Hoagland, even if combined as proposed in the Office Action, still would lack the above-noted features of claim 18 and thus these references, considered individually or in combination, do not render obvious the subject matter now defined by claim 18. Independent claim 34 now similarly recites the above-mentioned subject matter distinguishing claim 18 from the applied references, though claim 34 does with respect to a base station. Therefore, allowance of claims 18 and 34,

and all claims dependent therefrom, is warranted.

With respect to the rejection of claim 22, claim 22 has been amended and now further defines the “minimum resource parameter” as:

“the minimum resource parameter represents a minimum ratio of a number of information bits processed by the communication unit in a scheduling frame to an expended processing and operating power spent during the radio access by the communication unit in said scheduling frame.”

In the rejection at pgs. 3-4, the Office Action again misapplies the “broadest reasonable interpretation” standard to neglect various claimed features recited by claim 22. Specifically, the Office Action argues:

“With regard to claim 22, the examiner notes that the claim is broadly interpreted as putting forth a concept of calculating the processed (or transmitted) bits in relation to the processing-and-operating power spent during the transmission in the mobile device.”

However, in contrast to the allegation in the Office Action, claim 22 clearly recites that the minimum resource parameter “represents a minimum ratio of a number of information bits processed by the communication unit in a scheduling frame to an expended processing and operating power spent during the radio access by the communication unit in said scheduling frame.” The specification provides various non-limiting examples of this “minimum ratio” at paragraphs [0058]-[0069].

None of the cited prior art references, whether considered individually or in combination, teach or suggest this above-noted feature of the Applicants’ claim 22. Regarding the teachings of Holtzmann and Havinga referenced by the Office Action at pgs. 3-4 (item 8), neither of these references disclose the recited feature of a “minimum ratio” as recited by the Applicants’ claim 22. Holtzmann’s FIGs. 4 and 5 do not illustrate anything related to a “minimum ratio.” Furthermore, the description of Holtzmann’s FIGs. 4 and 5 simply describe how Holtzmann’s

operation is related to estimating available transmit power for data service using average and predicted transmit powers (see col. 12, lines 1-5), neither of which is similar to the “minimum ratio” recited by the Applicants’ claim 22. Although the Office Action (pg. 4) alleges that “the prior art teaches mathematical functions (averaging, etc.) which are in effect a ‘ratio’ and are used to modify (at least) the data rate,” this allegation is completely inaccurate because Holtzman’s disclosure of “averaging” transmit powers is fundamentally different from the “minimum ratio” recited by the Applicants’ claim 22. For example, Holtzman’s method teaches averaging various transmit power, such as, for example, the transmit powers of 5, 7, and 12 units of power, to obtain an average transmit power of 8 units of power, and then using this average transmit power to estimate available transmit power. The averaging process taught by Holtzman has nothing to do with representing a minimum resource parameter as “a minimum ratio of a number of information bits processed by the communication unit in a scheduling frame to an expended processing and operating power spent during the radio access by the communication unit in said scheduling frame,” as recited by the Applicants’ claim 22.

Furthermore, the Office Action neglects that claim 22 more precisely defines the minimum resource parameter as being obtained from the communication unit. Claim 22 makes clear that the recited “minimum resource parameter” represents “a minimum ratio of a number of information bits processed by the communication unit in a scheduling frame to an expended processing and operating power spent during the radio access by the communication unit in said scheduling frame.” In other words, the minimum resource parameter is related to the amount of processed information (bits) by the communication unit relative to the power spent by the communication unit for processing and operating (e.g., for reception/transmission,

demodulation/modulation, decoding/coding, etc.) in a scheduling frame. Holtzmann also fails to teach or suggest at least this recited feature of the Applicants' claim 22.

Regarding the Office Action's comments (pgs. 3-4) as to the different states of a mobile terminal (off, idle, etc.) as disclosed by Havinga (pg. 7), the Office Action has not explained why Havinga's disclosure of these different states is relevant to the rejection of claim 22. These states of a mobile terminal commonly refer to the operation states of the mobile in a state diagram and typically have certain implications on the connection state of the mobile, but are as such not related to scheduling (if a mobile is scheduled, it generally implies that the mobile is in active mode). Therefore, Havinga's disclosure of different "states" fails to cure any of the above-noted deficiencies of Holtzmann. Klein and Hoagland similarly fail to cure these above-noted deficiencies of Holtzmann.

Accordingly, the Applicants submit that the teachings of Holtzman, Havinga, Klein and Hoagland, even if combined as proposed in the Office Action, still would lack the above-noted features of claim 22 and thus these references, considered individually or in combination, do not render obvious the subject matter now defined by claim 22. Therefore, allowance of claim 22 is warranted for at least these additional reasons.

In view of the above, it is submitted that this application is in condition for allowance and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

/James Edward Ledbetter/

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